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Muderlak et al.

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(54) **THROUGH SURFACE HAND DRYING SYSTEM**

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See application file for complete search history.

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 326 days.

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(63) Continuation of application No. 13/842,603, filed on Mar. 15, 2013, now Pat. No. 9,562,721.

Primary Examiner — John P McCormack

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(51) **Int. Cl.**

F26B 5/04 (2006.01)
A47K 10/48 (2006.01)
F26B 20/00 (2006.01)
A61L 9/12 (2006.01)
A61L 9/03 (2006.01)

(57) **ABSTRACT**

The present disclosure provides an apparatus for automatically dispensing air, for example, for hand drying, through either a dedicated air only spout (side mount embodiment) or through a multi-use spout configured for dispensing water, soap and/or air. The air drying module, which is typically positioned below a counter, can be modified according to the system needs to operate with hot and/or cold air and to optionally include a filter and/or fragrance dispenser.

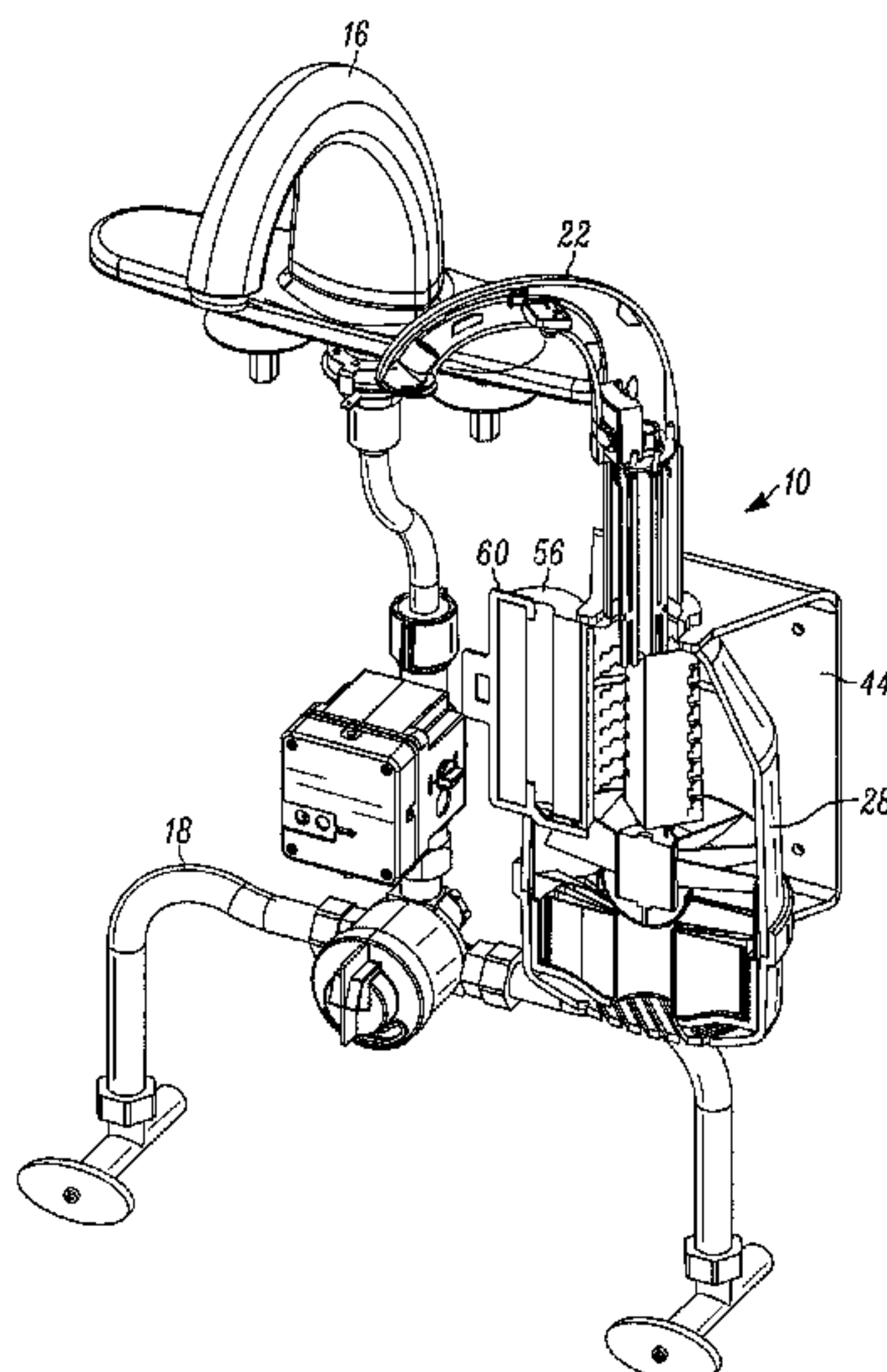
(52) **U.S. Cl.**

CPC **A47K 10/48** (2013.01); **A61L 9/12** (2013.01); **F26B 20/00** (2013.01); **A47K 2210/00** (2013.01); **A61L 9/03** (2013.01); **A61L 9/127** (2013.01); **A61L 2209/14** (2013.01)

(58) **Field of Classification Search**

CPC A47K 10/48; A47K 2210/00; A61L 9/127

9 Claims, 19 Drawing Sheets



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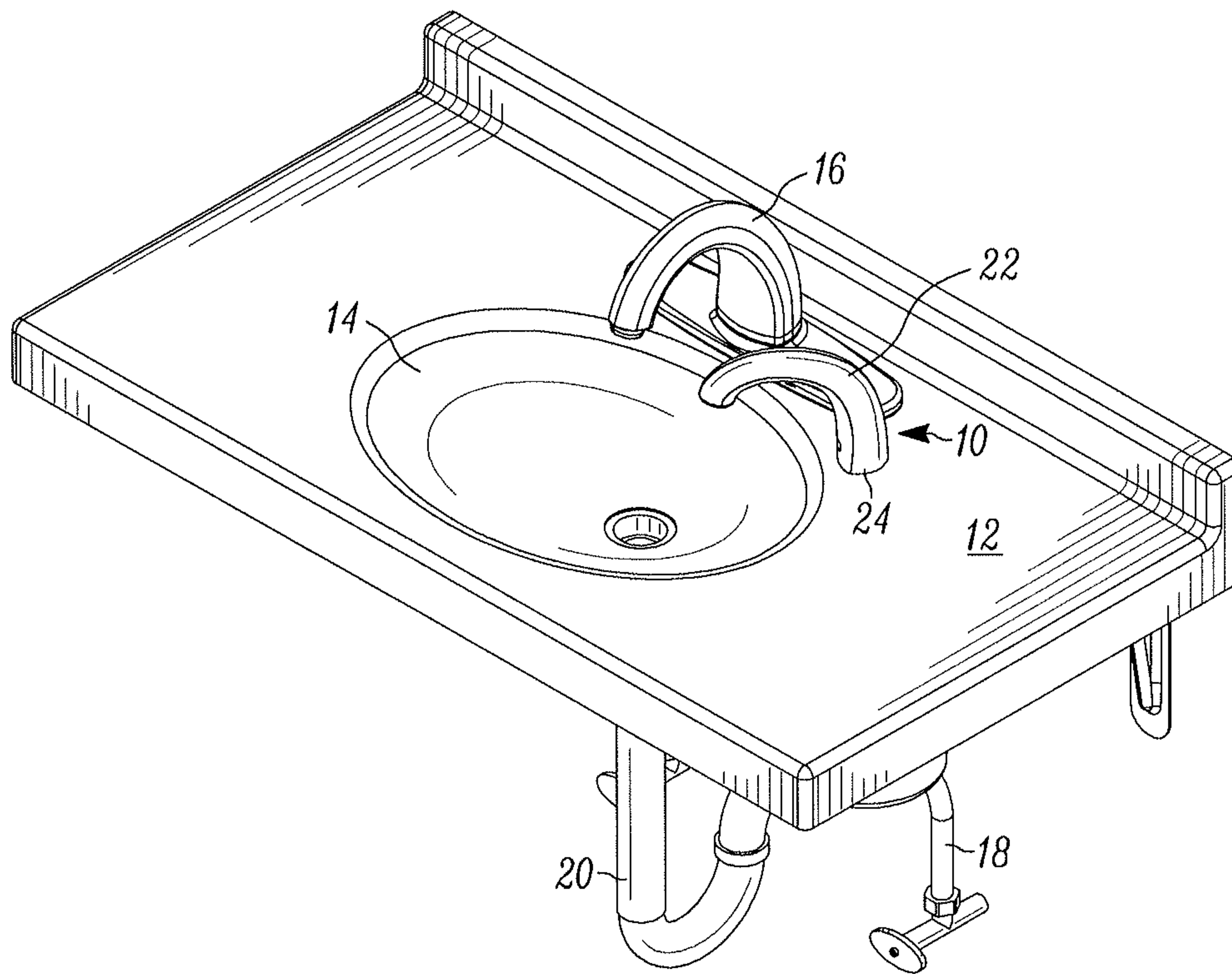


FIG. 1

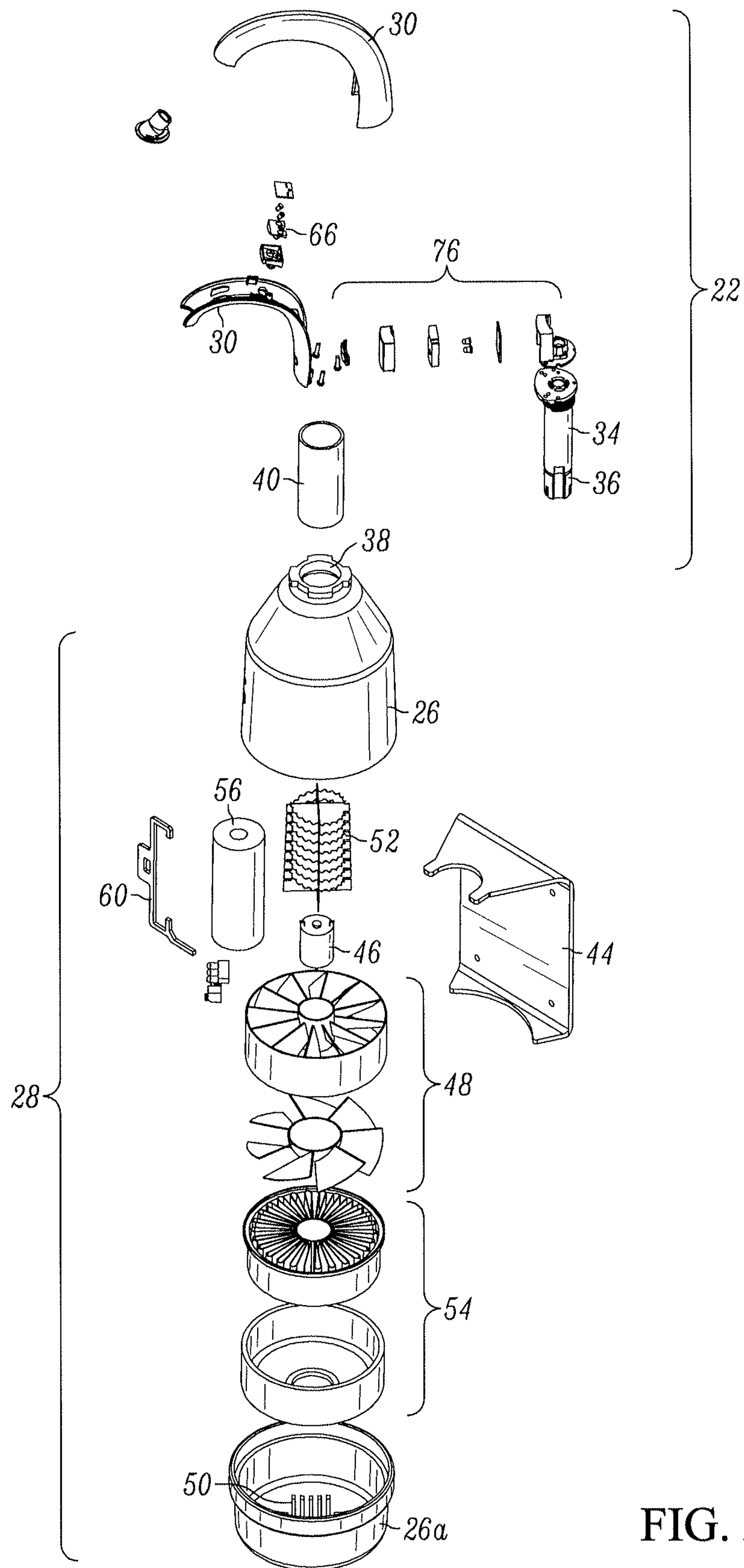


FIG. 2

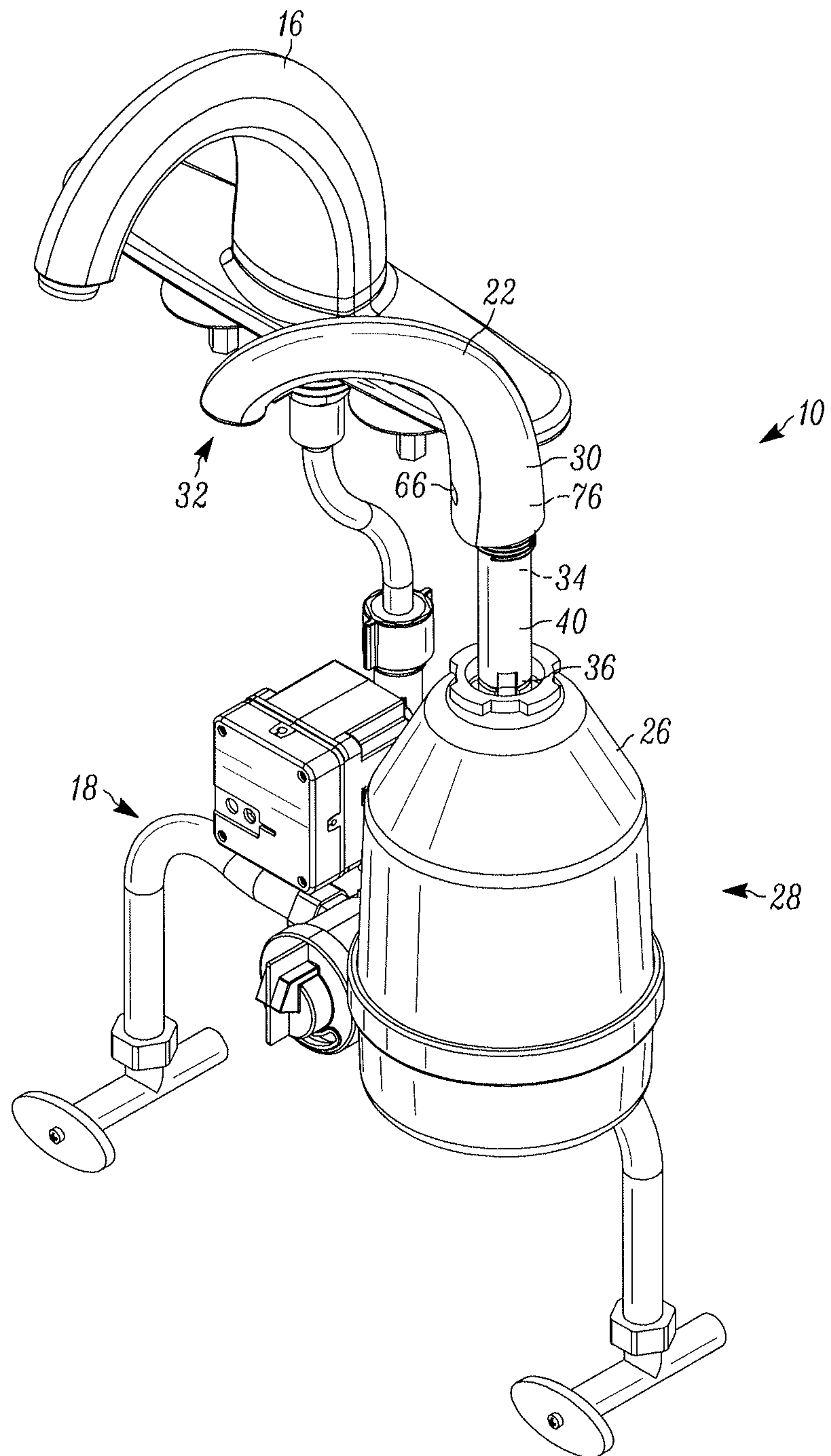


FIG. 3

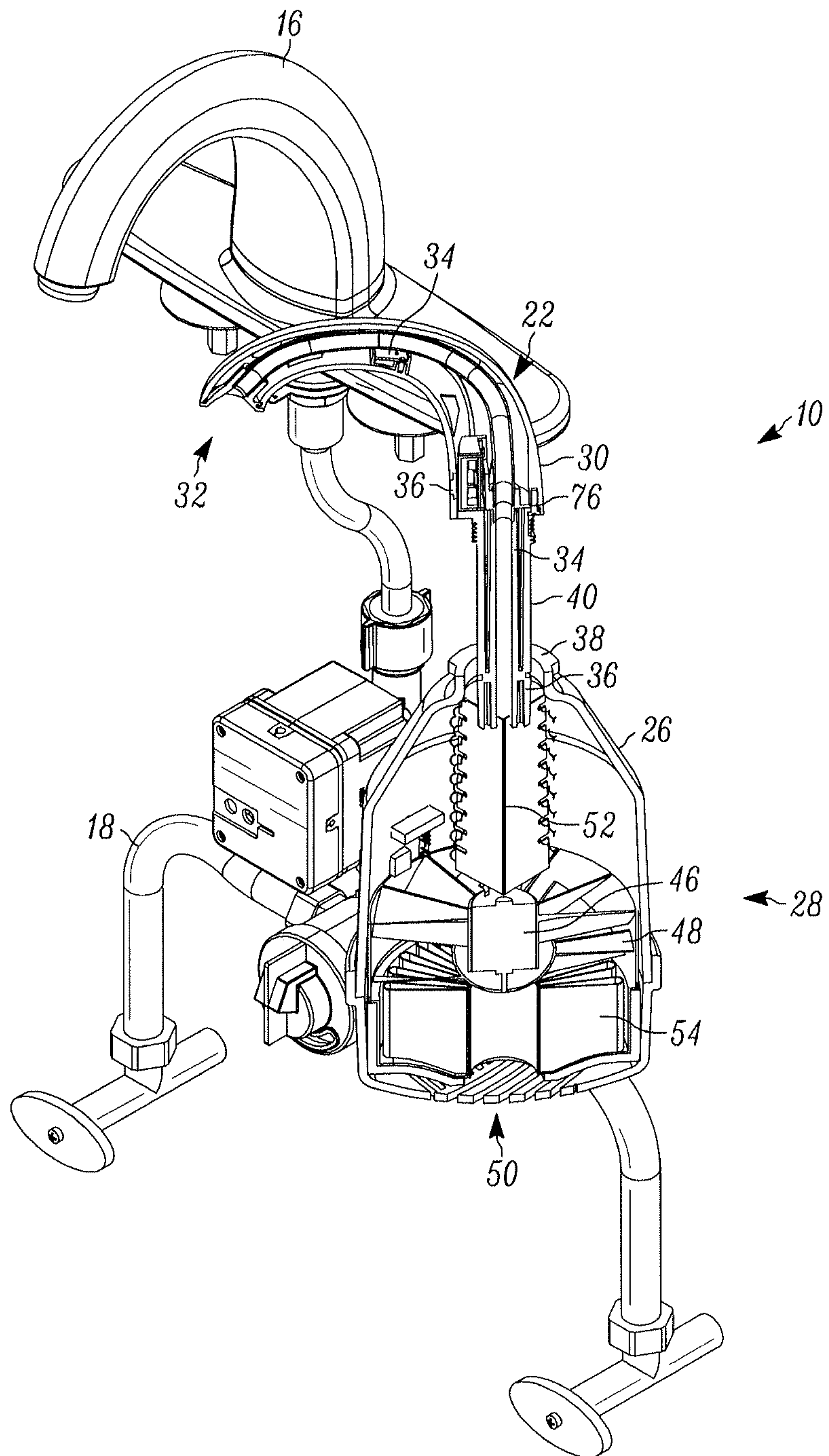


FIG. 4

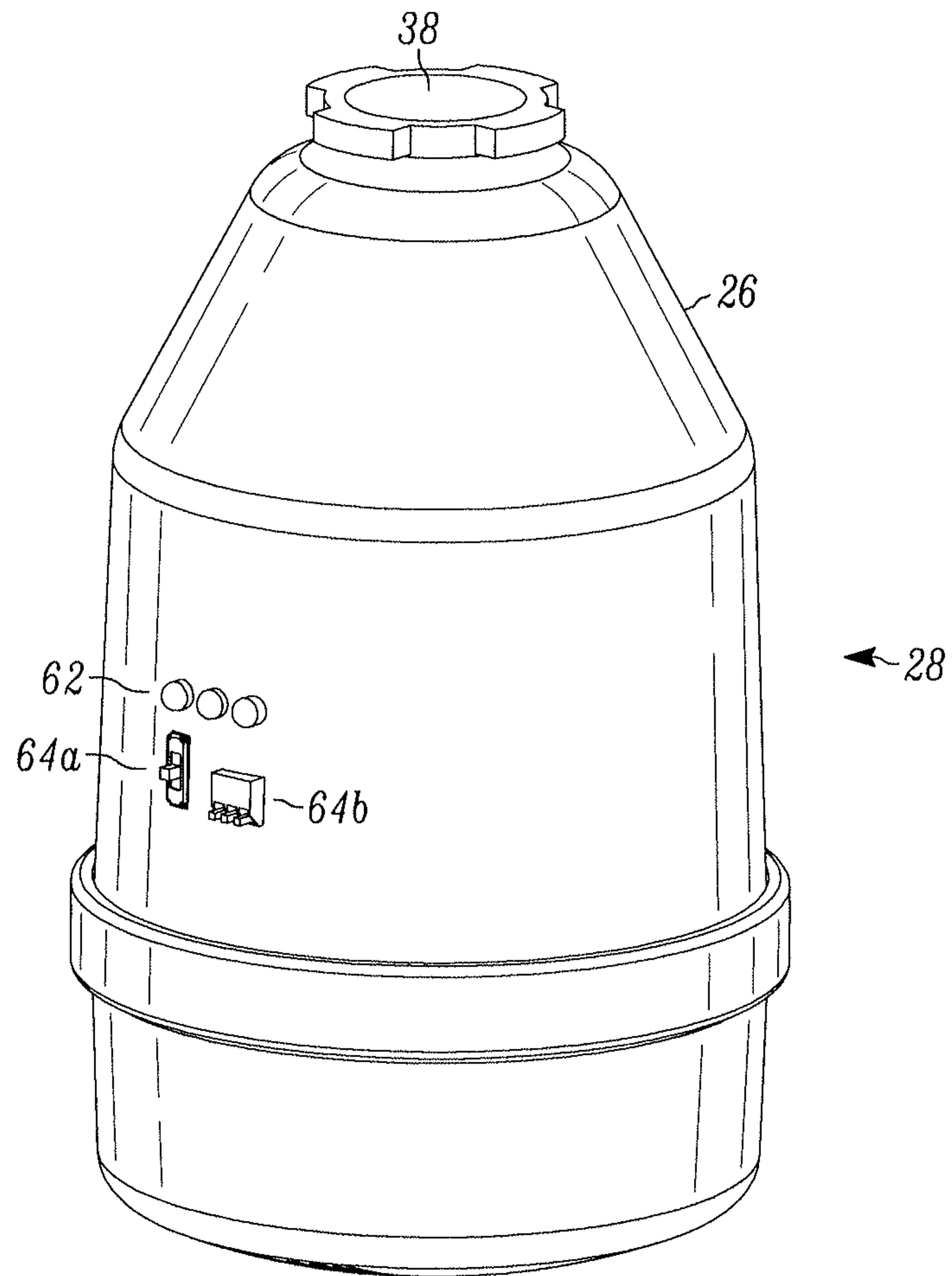


FIG. 5

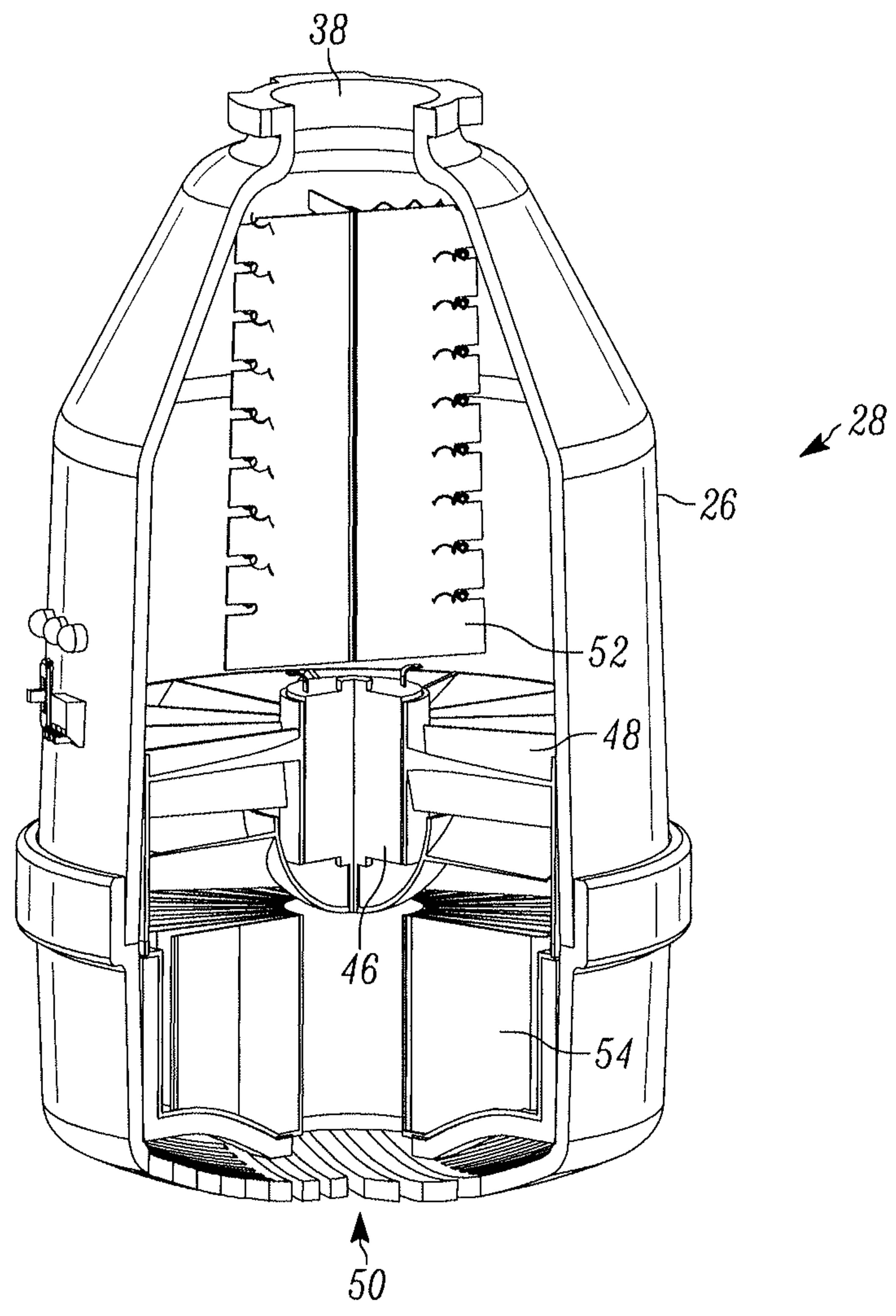


FIG. 6

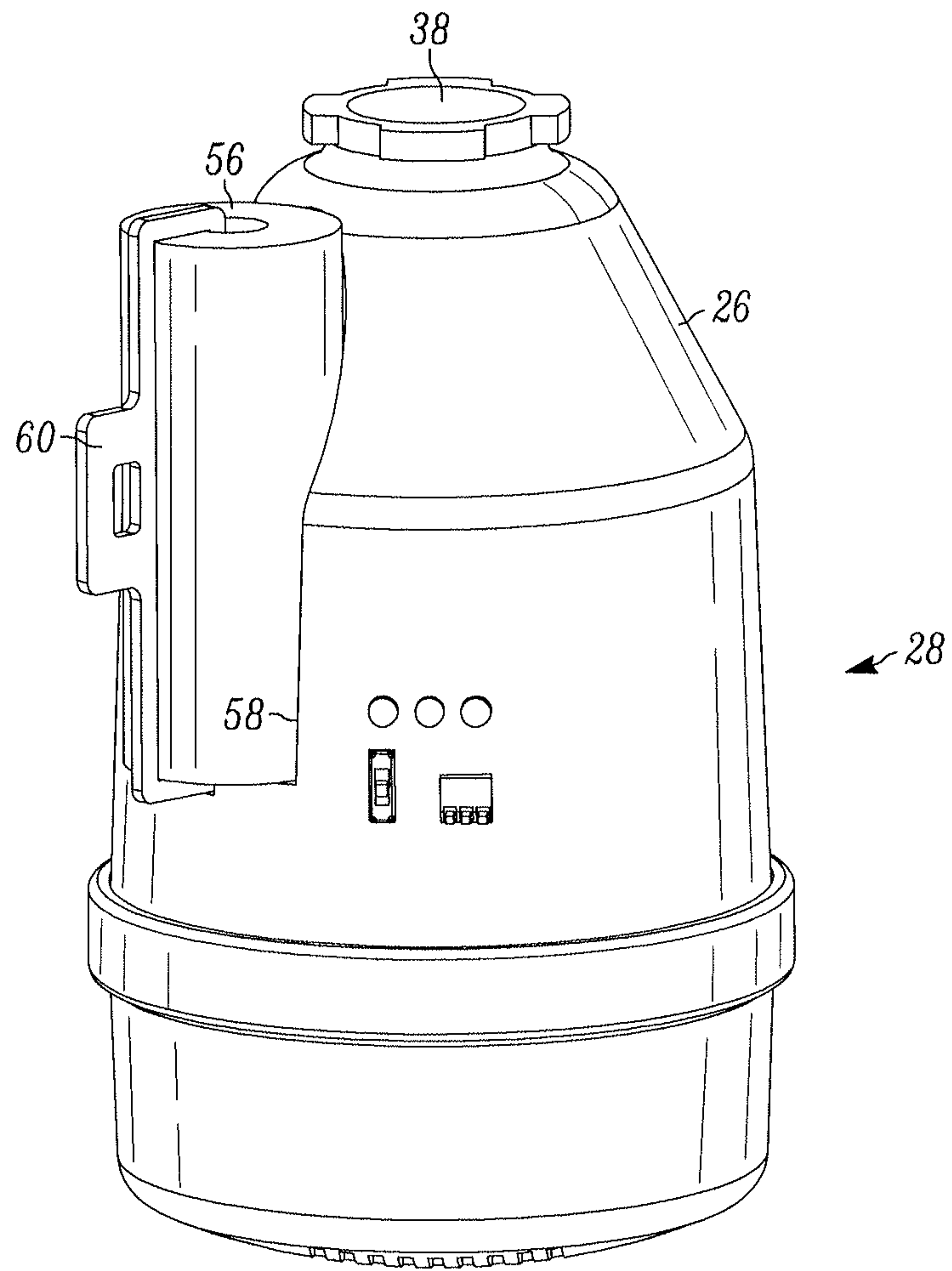


FIG. 7

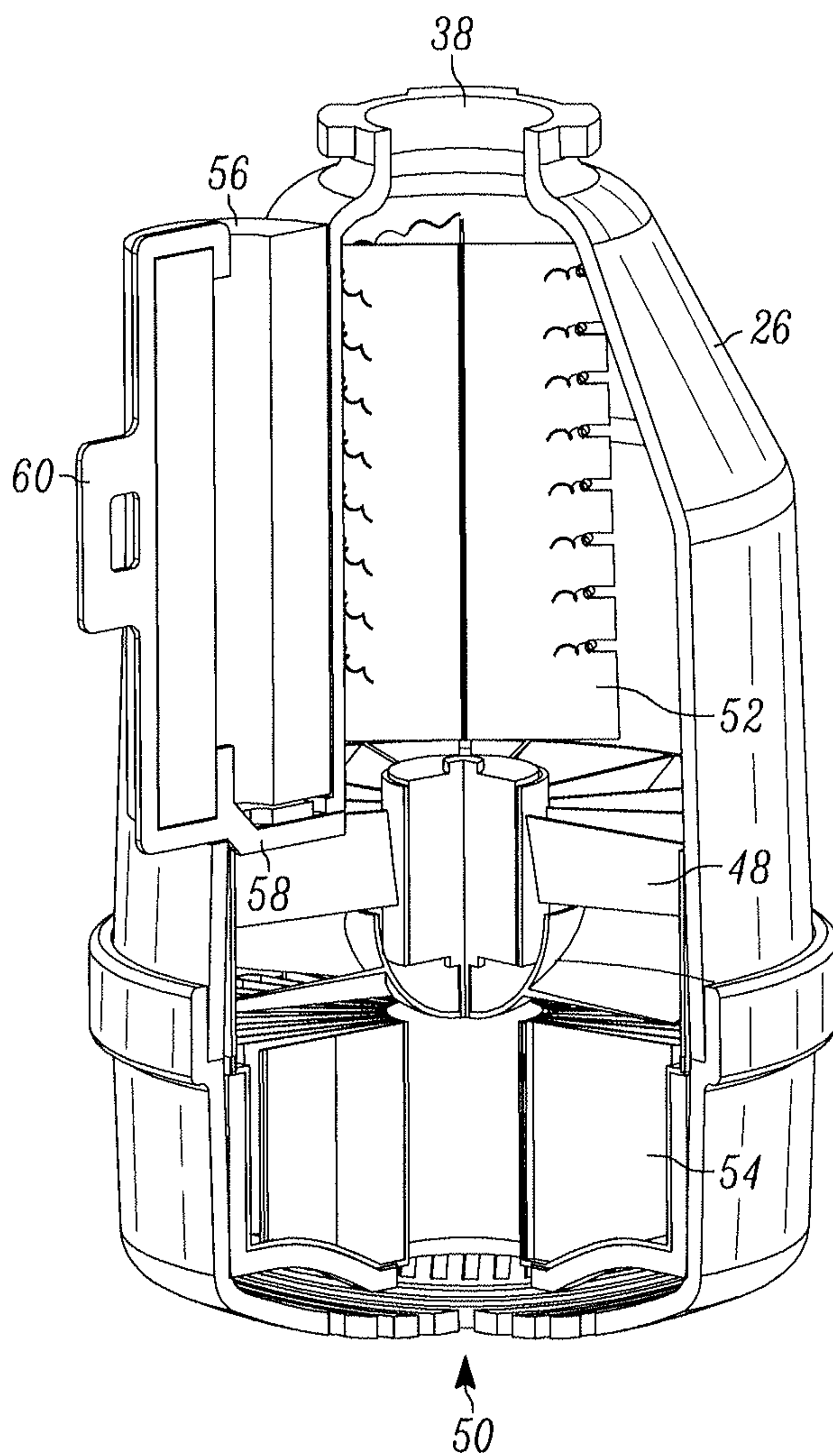


FIG. 8

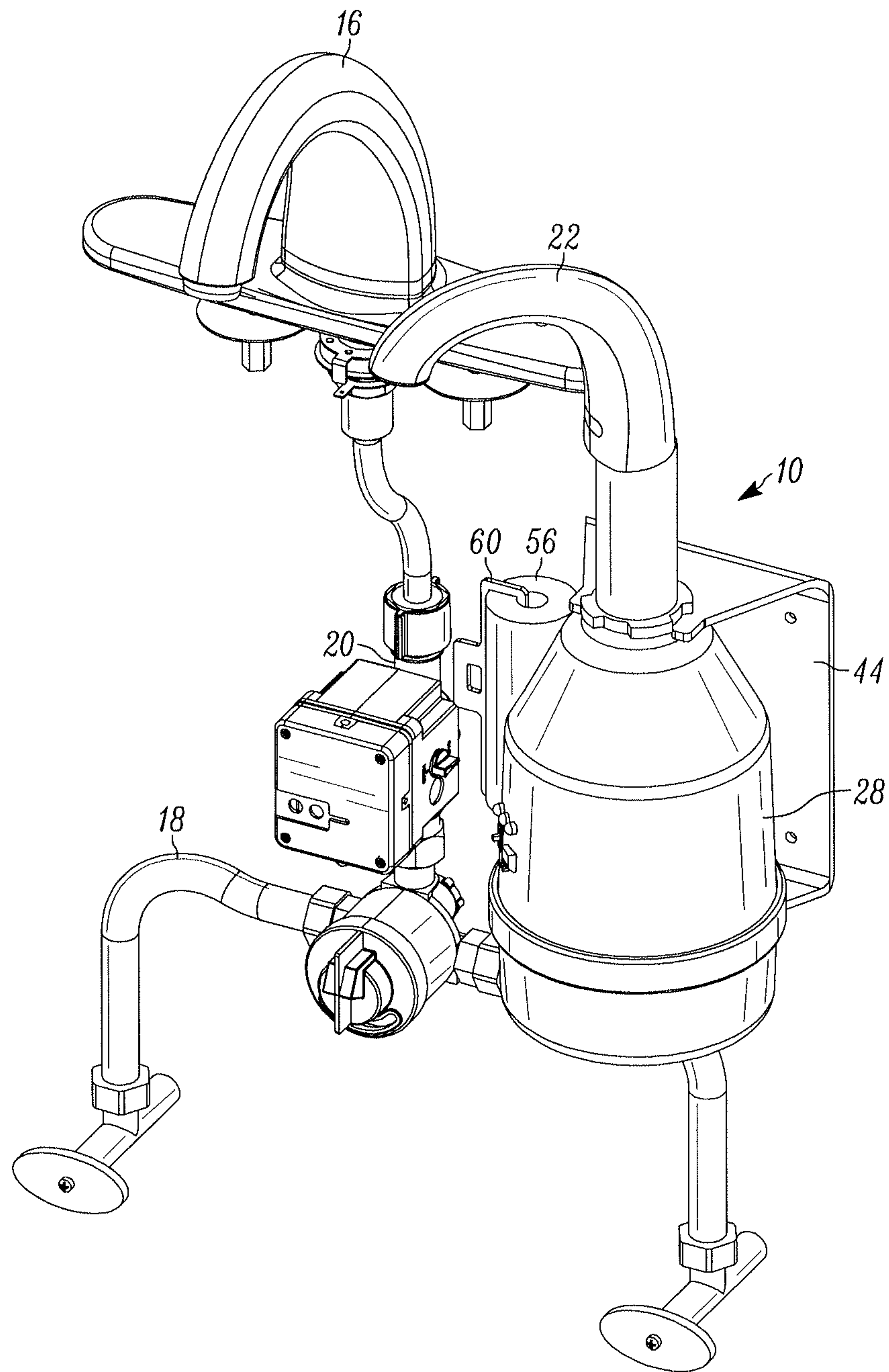


FIG. 9

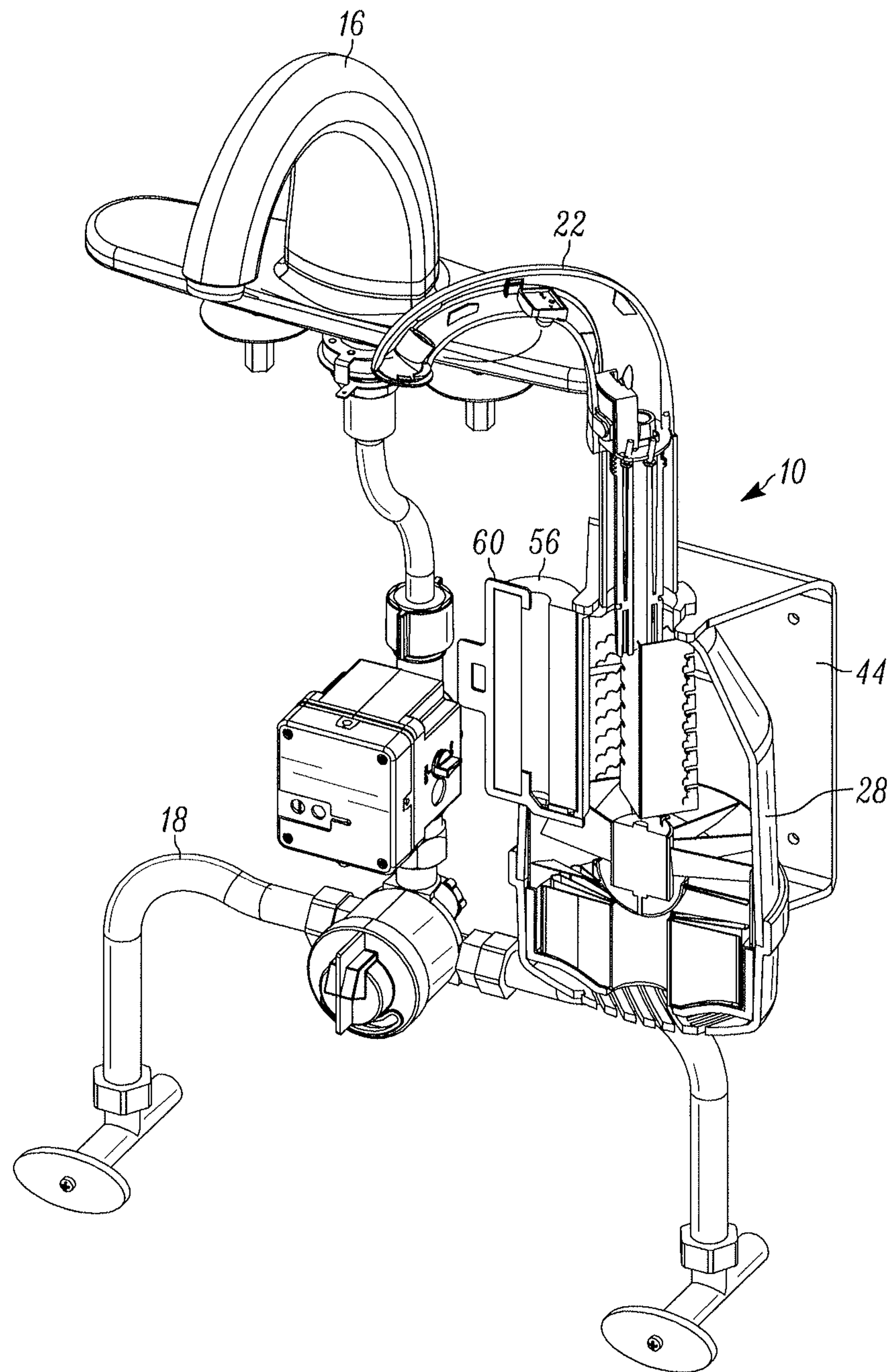


FIG. 10

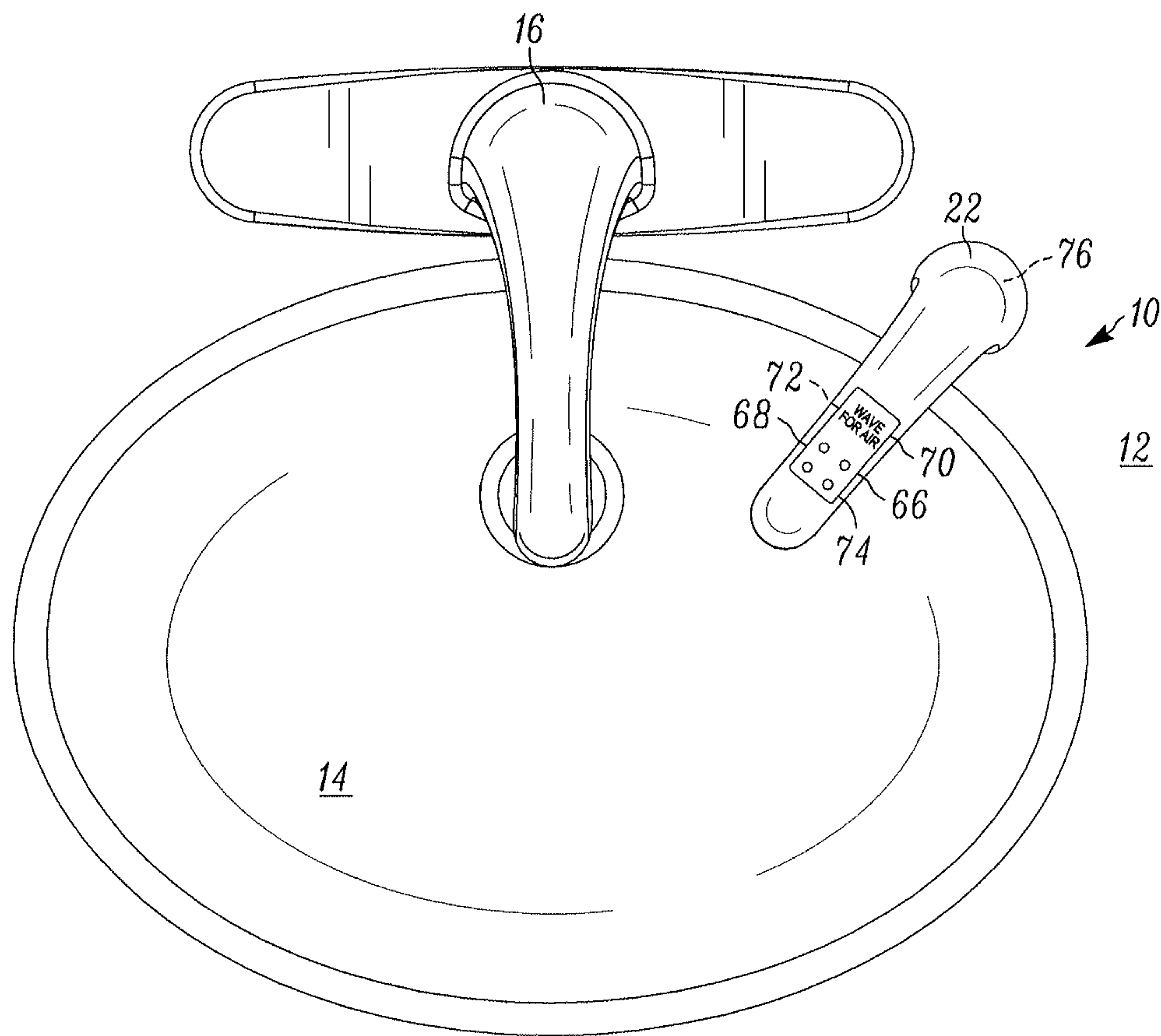


FIG. 11

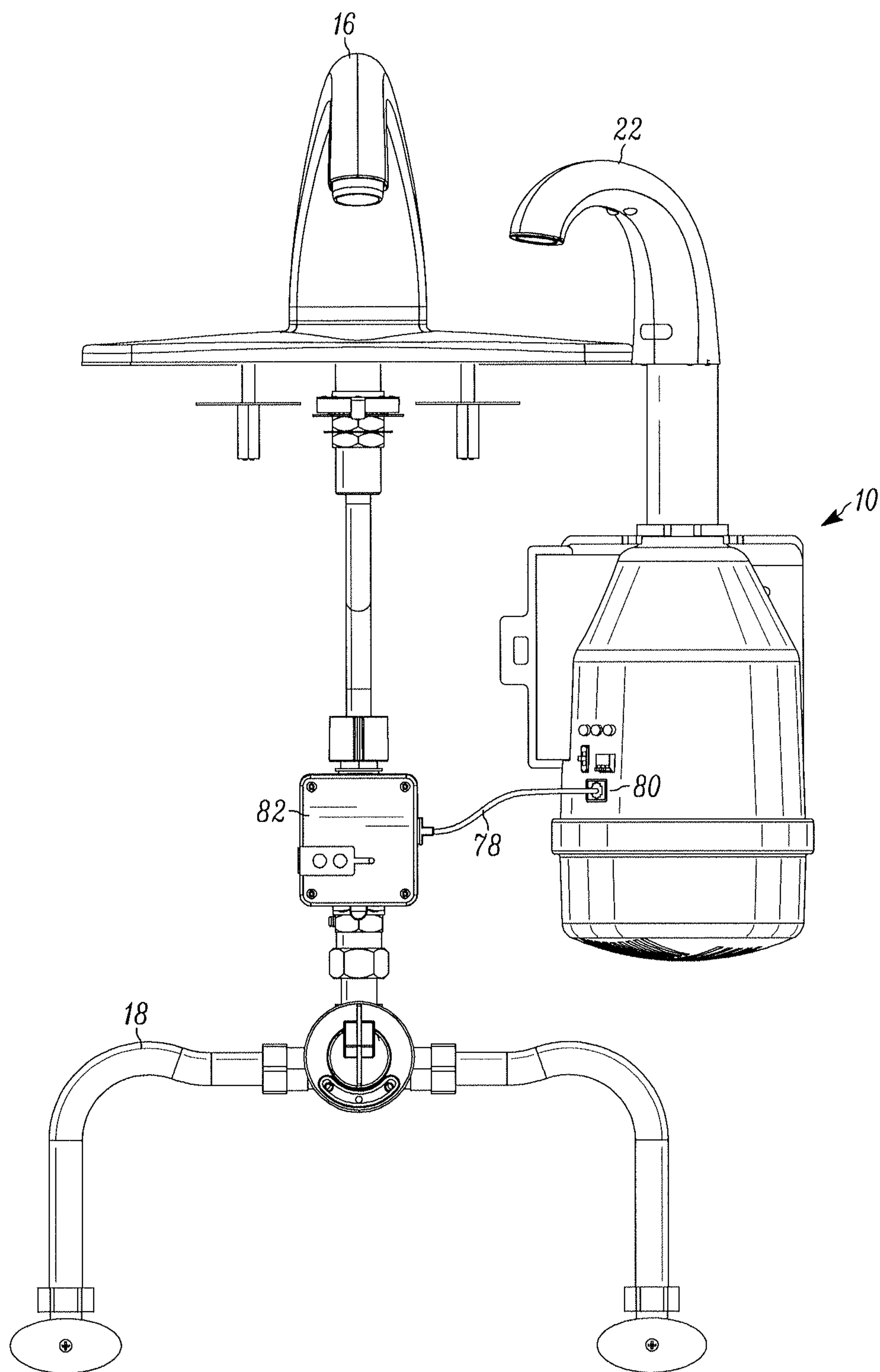


FIG. 12

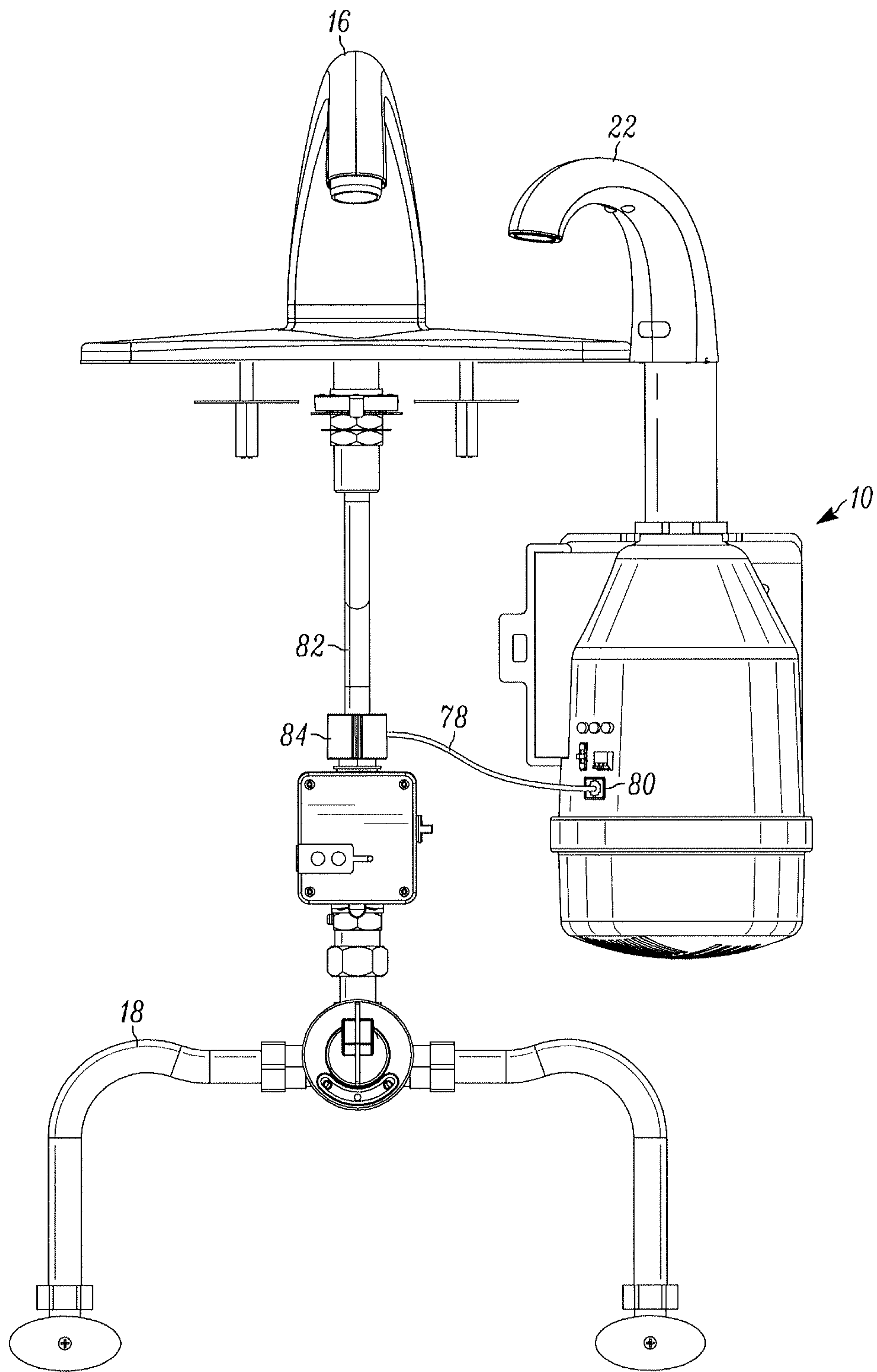


FIG. 13

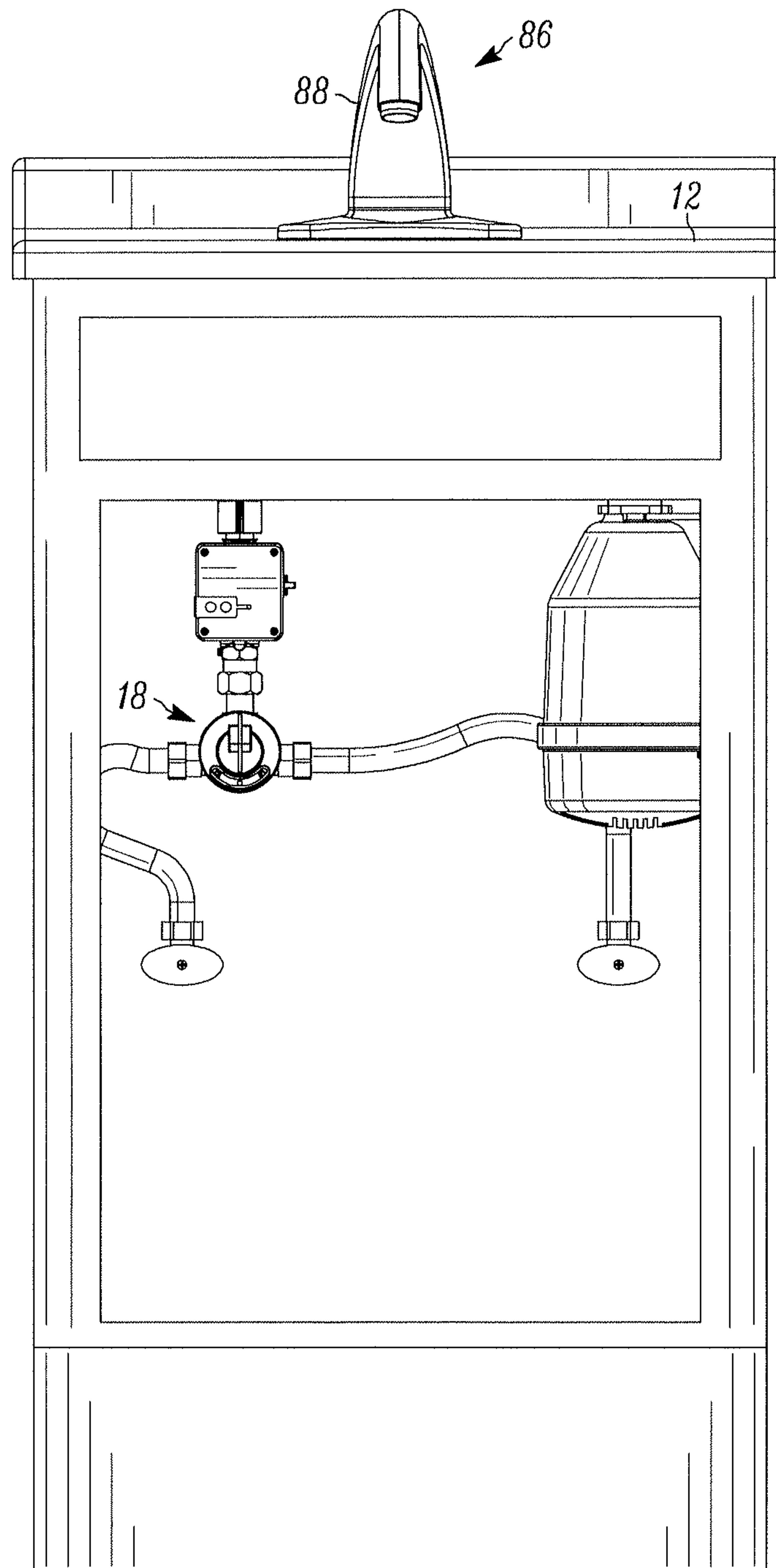


FIG. 14

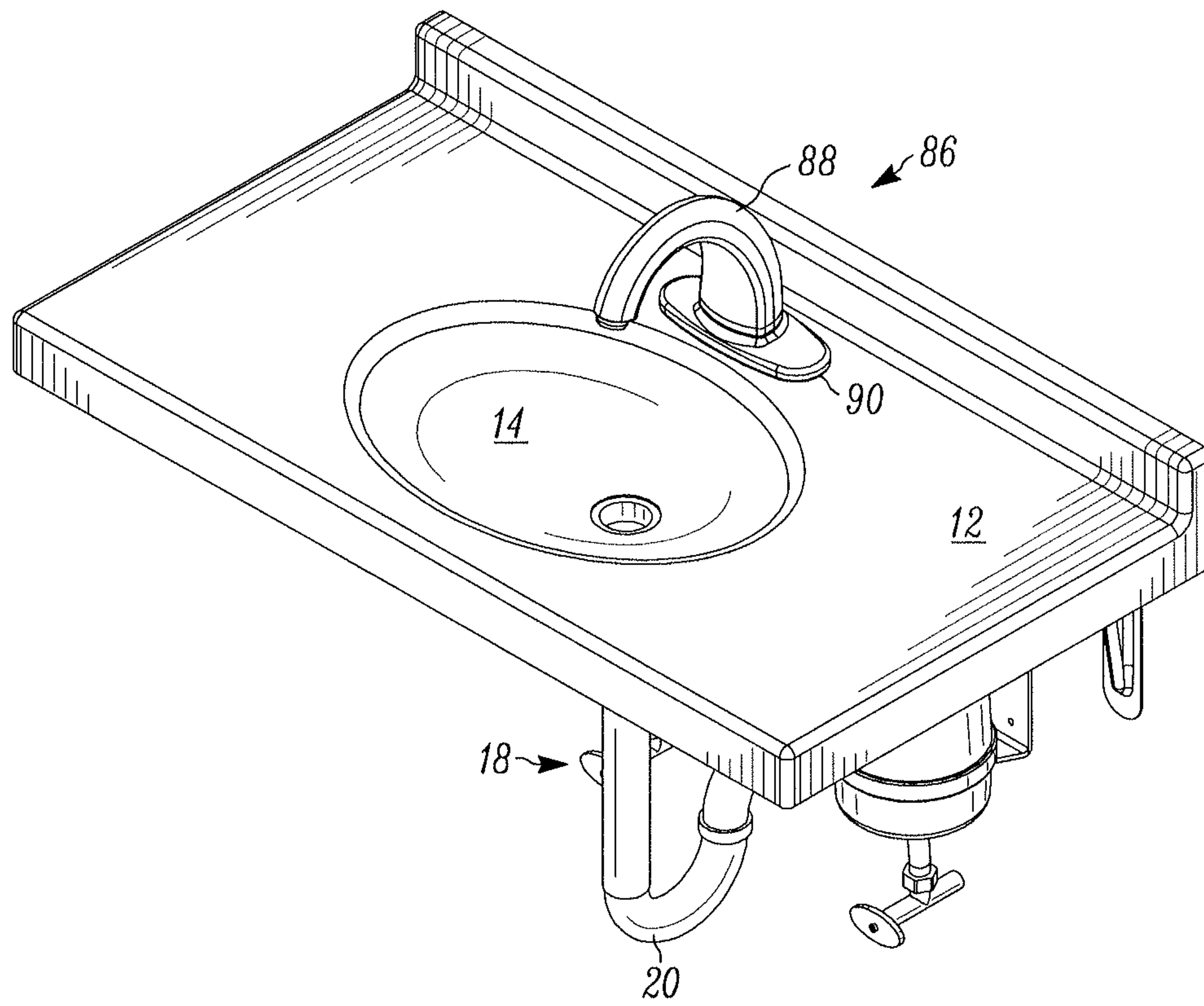


FIG. 15

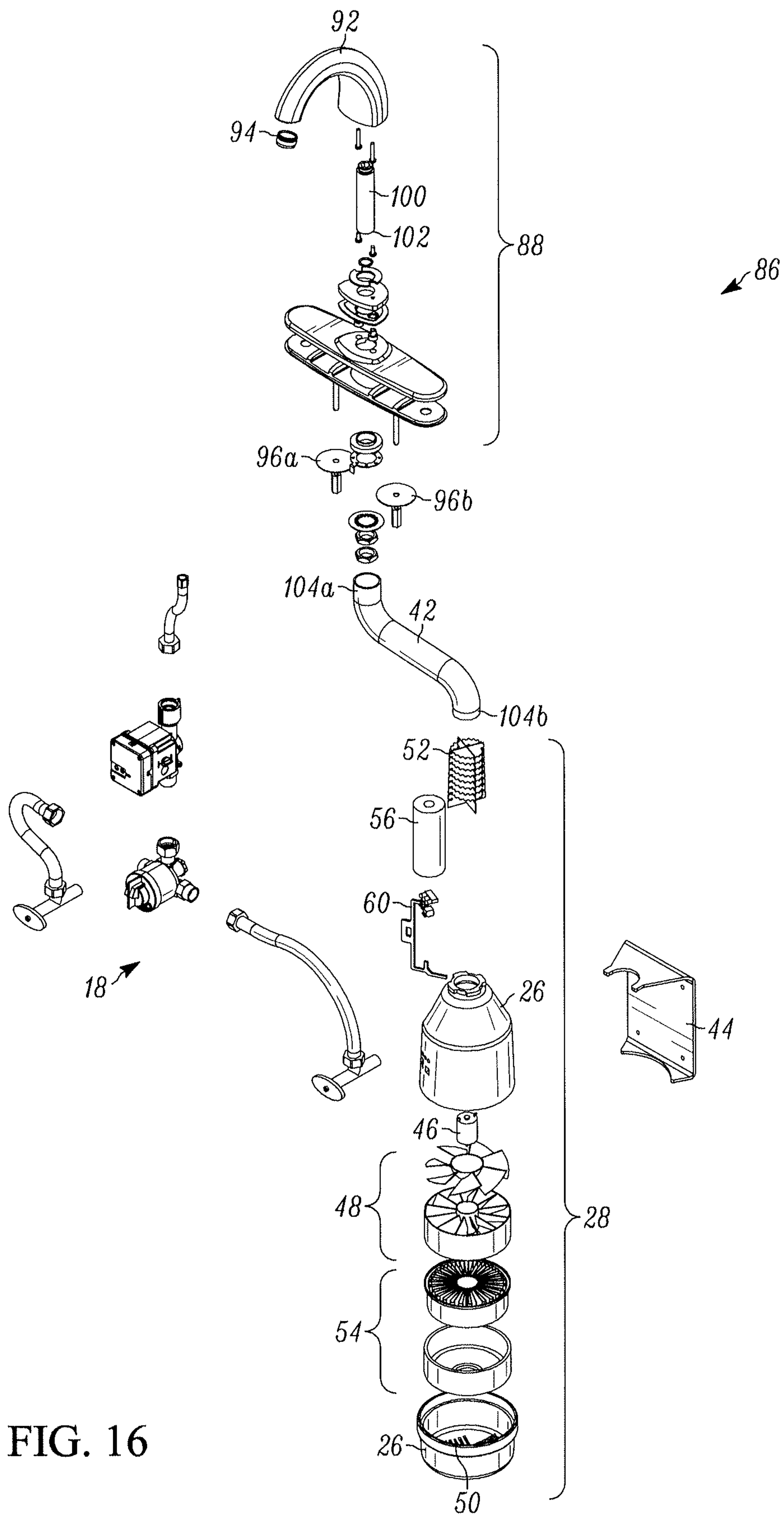


FIG. 16

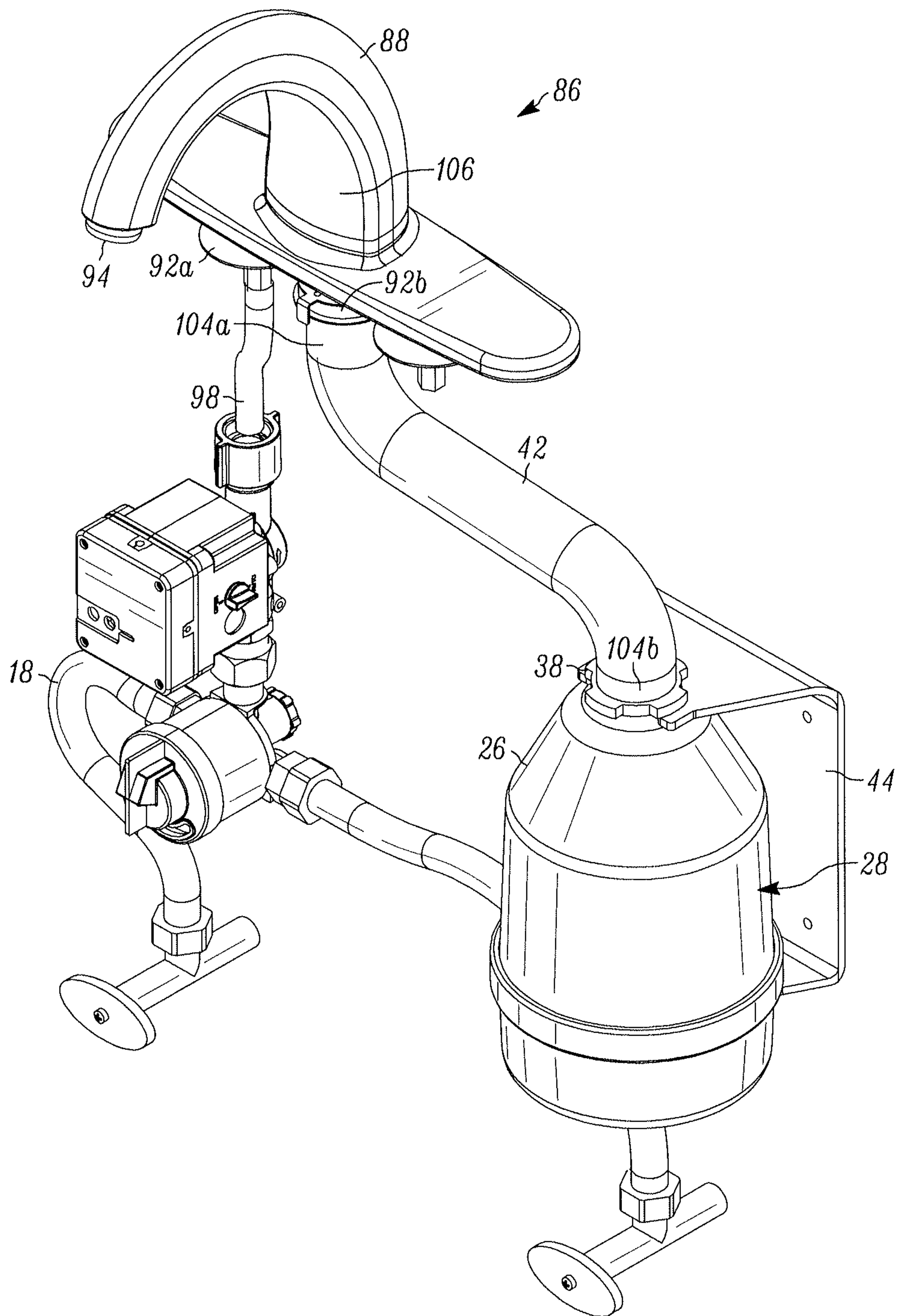


FIG. 17

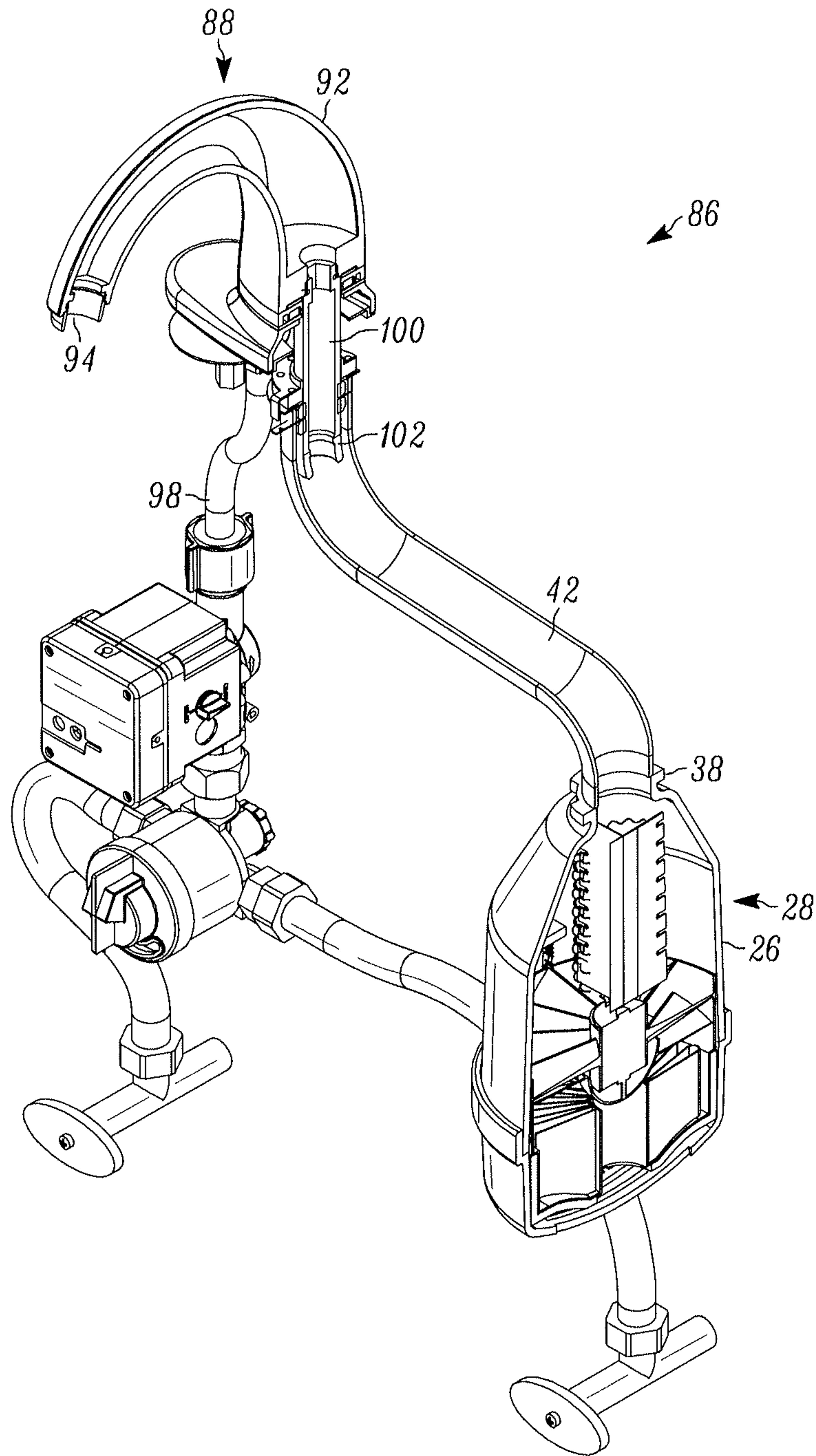


FIG. 18

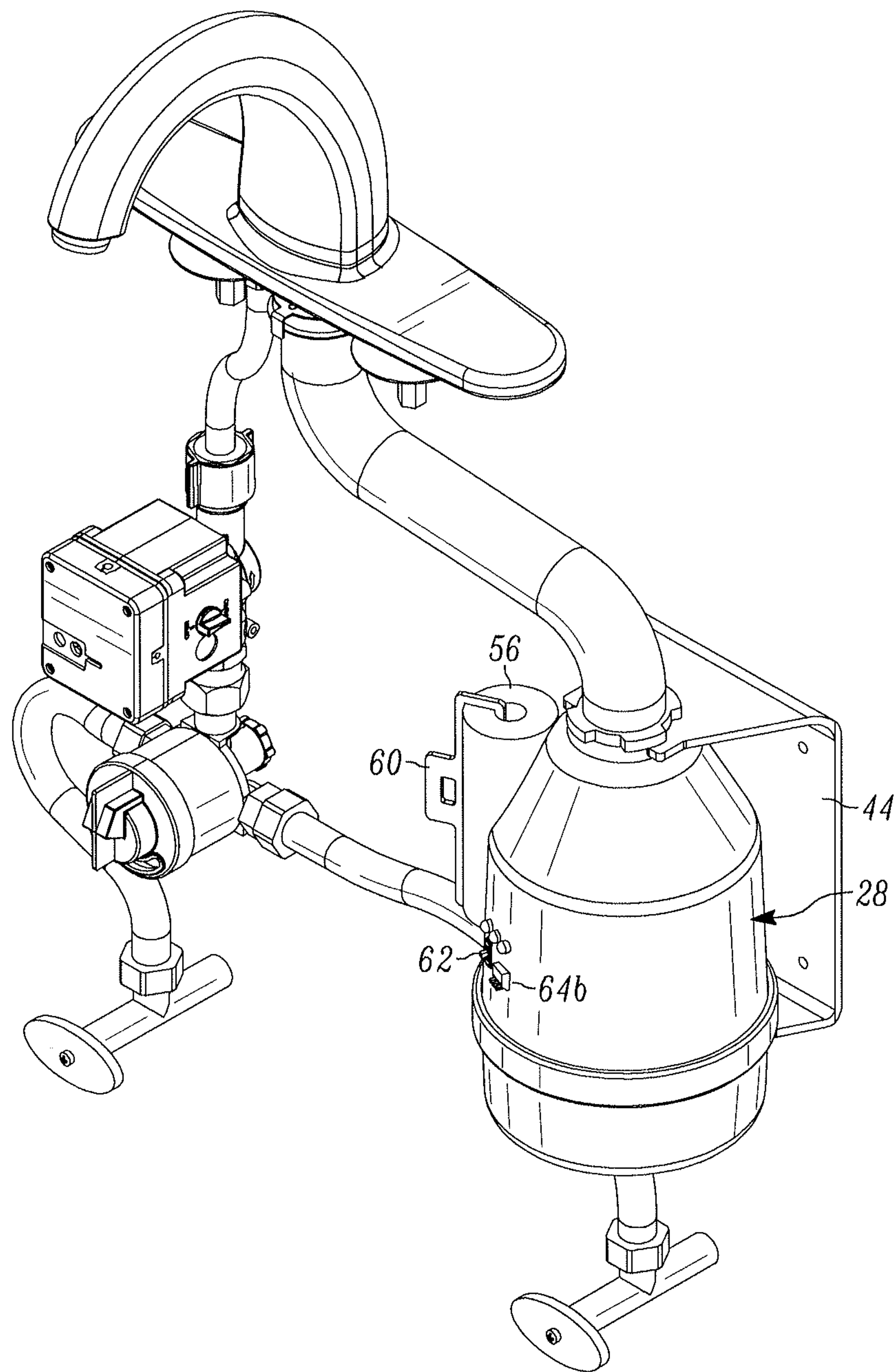


FIG. 19

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**THROUGH SURFACE HAND DRYING
SYSTEM**

FIELD

Embodiments of this disclosure relate to an automatic dispenser apparatus for dispensing a flow of air and/or water.

BACKGROUND

In washrooms and other locations, wall-mounted hand dryers that are hands-free and automatically activated, are typically installed for users to dry their hands. However, a drawback of wall-mounted dryers is that a person who has washed their hands in a sink is required to move to the location of the dryer, resulting in water dripping from their hands onto the sink counter or floor.

More recently, high speed, automatic drying changes for inserting the user's hands have been installed into many washrooms. However, such devices are very cumbersome and extremely noisy, particularly in an enclosed space such as a washroom.

It would be desirable to provide a hand drying apparatus and set-up that overcomes such drawbacks and can be readily installed into an existing washroom or other set-up.

SUMMARY

Embodiments of the present disclosure provide a dispenser apparatus for dispensing air, for example, for drying hands. The air dispensing apparatus can be mounted, for example, on a sink, counter, table, cabinet or other support substrate. The system allows for hand drying either through a dedicated air only spout (side mount embodiment) or through a multi-use spout (water, soap and/or air). The air drying module, which is typically positioned below the counter, can be modified according to the system to operate with hot and/or cold air and to include filters and/or fragrance dispensing options.

The air dispensing apparatus of the disclosure provides a robust automatic hand drying apparatus that can be affixed beneath a counter, table, etc. to either a dedicated spout (air only) or to a spout that is configured to dispense soap, water, sanitizer and/or other fluid. The apparatus can be configured to include air filtering to remove impurities from the air used to dry hands. The apparatus can also be configured to dispense an air fragrance that is separate from the air used to dry the user's hands by leveraging the motor/power and associated air movement created to better disperse fragrance into the environment. The air dispensing module is very serviceable, with the air drying module being easily removed from the assembly.

In embodiments, the disclosure provides an apparatus for automatically dispensing air, comprising a spout assembly mounted through a support substrate and connected to a drying module comprising a housing. In embodiments, the spout assembly is structured with an outlet for dispensing the air therethrough, an infrared sensor, and one or more indicator lights. The housing of the drying module contains a motor-driven fan operable for forcing airflow through the outlet of the spout assembly, and an air intake vent. Activation of the infrared sensor activates the drying module to draw air into the drying module and force the air through the outlet of the spout assembly.

The drying module of the air dispensing apparatus can optionally include an air heating mechanism, an air filter and/or a fragrance module that can be releasably mounted to

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the drying module and can be configured to release a fragrance into the surrounding air. In embodiments, the spout assembly and the drying module are connected by a quick release mechanism, e.g., a bayonet mount, to provide easy connection and disconnection.

In embodiments, the air dispensing apparatus is mounted adjacent to an automatic faucet, and the apparatus and the faucet are connected through a processor to coordinate activation of water and air delivery. In embodiments, the air dispensing apparatus comprises a processor electrically connected to a water intake for the faucet and is configured such that the apparatus is not activated during water flow to the faucet. In another embodiment, a valve mechanism is connected to a water intake pipe for the faucet and electrically connected to a processor for the air dispensing apparatus, which is configured to activate the valve mechanism to stop water flow to the faucet when the apparatus is activated.

In another embodiment, the disclosure provides an apparatus for automatically dispensing air and water as a multi-functional apparatus, comprising a spout assembly mounted through a support substrate and connected to a water source dispenser and to a drying module. The spout assembly is structured with an outlet for dispensing the water and the air therethrough, an infrared sensor and, optionally, one or more indicator lights.

In embodiments of the multi-functional air dispensing apparatus, activation of the infrared sensor activates a micro-processor configured to first activate the water source dispenser for a first time period to dispense water through the outlet of the spout assembly, then secondly activate the drying module to draw air into the drying module and force the air through the outlet of the spout assembly for a second time period. In another embodiment, first and second infrared sensors can be positioned on either side of the spout assembly, wherein activation of the first sensor actuates water flow and activation of the second sensor actuates air flow. In embodiments, the infrared sensor is programmed through a processor to dispense water by a single pass of an object, and dispense air by two or more passes of an object within a set time period.

The design of the air dispensing apparatus allows for either a new installment or an easy retrofit with an automatic (or manual) faucet, with a connection from a processor to an automatic faucet to control the timing and/or duration of water flow and air flow. In other embodiments, a retrofit with an existing manual or automatic faucet can be easily achieved through connections from the air dispensing apparatus to the water intake for the faucet and/or a water shut-off valve.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the disclosure are described below with reference to the following accompanying drawings, which are for illustrative purposes only. Throughout the following views, the reference numerals will be used in the drawings, and the same reference numerals will be used throughout the several views and in the description to indicate the same or like parts.

FIG. 1 is a perspective view of an embodiment of an air dispensing apparatus according to the disclosure mounted on the counter of a sink.

FIG. 2 is an exploded view of the air dispensing apparatus of FIG. 1.

FIG. 3 is a perspective view of the air dispensing apparatus as depicted in FIG. 1, with the sink and counter not depicted.

FIG. 4 is a perspective, partial cross-sectional view of the air dispensing apparatus of FIG. 3.

FIG. 5 is a perspective view of the air drying module of the air dispensing apparatus of FIG. 4.

FIG. 6 is an elevational, partial cross-sectional view of the air drying module of FIG. 5.

FIG. 7 is an embodiment of an air drying module with a fragrance dispersing module mounted thereon.

FIG. 8 is an elevational, partial cross-sectional view of the air drying module of FIG. 7.

FIG. 9 is a perspective view of another embodiment of an air dispensing apparatus according to the disclosure mounted adjacent to a faucet, with the air drying module depicted in FIG. 7.

FIG. 10 is a perspective, partial cross-sectional view of the air dispensing apparatus of FIG. 9.

FIG. 11 is a top down view of an embodiment of an air dispensing apparatus with infrared sensors and messaging on the top surface according to the disclosure as a side mount on the counter of a sink.

FIG. 12 is a perspective view of an embodiment of a set-up of an air dispensing apparatus according to the disclosure as a side mount on the counter of a sink.

FIG. 13 is a perspective view of another embodiment of a set-up of an air dispensing apparatus according to the disclosure as a side mount on the counter of a sink.

FIG. 14 is a front view of an embodiment of a multi-functional air dispensing apparatus according to the disclosure mounted on the counter of a sink.

FIG. 15 is a perspective view of the multi-functional air dispensing apparatus of FIG. 14.

FIG. 16 is an exploded view of the air dispensing apparatus of FIG. 14.

FIG. 17 is a perspective view of the air dispensing apparatus as depicted in FIG. 14, with the sink and counter not depicted.

FIG. 18 is an elevational, cross-sectional view of the air dispensing apparatus of FIG. 17.

FIG. 19 is an embodiment of a multi-functional air dispensing apparatus according to the disclosure with a fragrance dispersing module mounted thereon.

DETAILED DESCRIPTION

Embodiments of the disclosure relate to an apparatus for automatically dispensing a flow of air. The air dispensing apparatus can be mounted on a sink, a counter, a table, a cabinet or other substrate and provides the ability to dispense air automatically to the user

The air dispensing apparatus can be automatically activated using an infrared or similar sensor and an associated drive system.

An embodiment of an air dispensing apparatus 10 according to the disclosure is described with reference to FIGS. 1-6. Referring to FIG. 1, in the depicted embodiment, the air dispensing apparatus 10 is shown mounted through a counter 12 of a sink 14 as a side mount adjacent to a water faucet 16. Also depicted are a water valve and mixer assembly 18 for automatic hot and cold water delivery to the water faucet 16, and a standard plumbing drain 20 connected to the sink 14. FIG. 2 illustrates the apparatus 10 in an exploded view, and FIGS. 3-4 depict the air dispensing apparatus 10 positioned adjacent to a water faucet 16 without the presence of the counter 12 or sink 14.

As shown in FIG. 1, the air dispensing apparatus 10 comprises a spout assembly 22 mounted through a hole 24 in the counter 12 (or other support substrate). The spout

assembly 22 is releasably connected to the housing 26 of a drying module 28, which are positioned under the counter 12. As a power source, the drying module 28 can be, for example, hard-wired to a power source, powered by a power pack leveraging batteries, or other means known and used in the art.

The spout assembly 22 is structured with spout housing 30 with an outlet 32 for dispensing the air therethrough and a stem section 34 having an end 36 that is structured for mating connection onto the open end 38 of the drying module housing 26. As depicted in FIGS. 2-4, in embodiments, the ends 36, 38 of the stem section 34 and the drying module housing 26 are connected by a quick release mechanism, for example, by a bayonet mount. As illustrated, the stem section 34 of the spout assembly 22 can be housed within a tubular protective sleeve 40. In embodiments, the spout assembly 22 and the drying module housing 26 can be connected by a flexible tubing 42 (as depicted, for example, in FIG. 18) with the drying module 28 affixed to a support bracket 44 that can be mounted on a supporting wall or other substrate.

The housing 26 of the drying module 28 contains a motor 46 connected to a fan assembly 48 that is operable for forcing airflow through the outlet 32 of the spout assembly 22. The drying module housing 26 further includes an air intake vent 50 at the bottom section 26a of the housing 26.

In embodiments, the housing 26 can contain an optional air heating mechanism 52, e.g., heater coils, to warm the air as it passes through the drying module 28. The drying module 28 can further include an air filter 54 for filtering the intake air before it is dispensed from the apparatus.

Referring now to FIG. 2 and FIGS. 7-10, in embodiments, the housing 26 of the drying module 28 can comprise a fragrance dispersing mechanism. In some embodiments, the apparatus 10 can include a module 56 comprising a fragrance dispersing mechanism that can be releasably mounted in an external structure 58 of the drying module housing 26. The fragrance dispersing module 56 can be constructed of a fragranced material or structured to contain a fragranced material, for example, a wicking material containing a fragrance substance, a fragrance block or gel, etc.

In embodiments, the wicking material is composed of an absorbent material. Nonlimiting examples of suitable materials include polymeric materials, cellulosic-based materials, fabrics, polyesters, polyolefins, nylon, cellulose, acetates, foams (hydrophilic polyurethane), polyolefins, polyamides, acrylics, styrenics, among other materials.

The fragrance dispersing module 56 can be connected to the drying module housing 26 such that, upon activation of the drying module 28, air will flow (one way) through vents from the drying module 28 into the fragrance dispersing module 56, such that the fragrance is dispersed into the air outside the drying module 28 but does not pass into the spout assembly 22. The fragrance dispersing module 56 can include a handle 60 for ease of removal and placement. In embodiments, the drying module 28 and/or the fragrance dispersing module 56 can be configured with a mechanism (not shown) to control the incoming air flow from the drying module 28 into the fragrance dispersing module 56.

As illustrated in FIG. 5, the drying module 28 can include one or more LED indicator lights 62 and/or control switches 64a, 64b. In embodiments, the drying module 28 is structured with a plurality of LED indicator lights 62 in an array and optionally colored, for example, to indicate power, filter replacement, unit working without heat, replacement of fragrance dispersing module, system malfunction, etc. In

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embodiments, the drying module **28** can include an on/off switch or a slider switch **64a** (e.g., to turn on/off the air heating mechanism **52** and/or a dip switch **64b** to control unit settings such as timing of air flow, system activation, etc.

As illustrated in FIG. **3**, an infrared sensor **66** is situated in the spout assembly **22** to optimize ‘object in view’ performance and minimize accidental triggering of air flow. Activation of the infrared sensor **66** activates the drying module **28** to draw air into the drying module and force the air through the outlet **32** of the spout assembly **22**.

The infrared sensor **66** is connected to a processor (PCB) **76** within the spout assembly, which, in turn, is connected to a power source. The processor **76** is configured to communicate with the sensor **66** and the fan motor **46** via wiring to turn on and off the fan motor **46** of the drying module **28** when the infrared sensor **66** is or isn’t activated.

Referring now to FIG. **11**, in embodiments, the spout assembly **22** (shown in a top plan view) can be structured with an infrared sensor **66** positioned in an upward orientation for sensing hand motion above the spout assembly **22**. In embodiments, the sensor **66** is an infrared sensor or a capacitance sensor. Such placement of the infrared sensor **66** above the spout advantageously differentiates the required hand movement for activation of the air dispensing system from the sensor of an automatic water faucet, and avoids accidental or premature triggering of air flow from the system while water is being dispensed and hands are being washed. The placement of the infrared sensor **66** above the spout also eliminates extremely narrow object-in-view tolerances due to the varying surfaces and distances of the sink below and the surface light reflection which can cause problems with the operation of downwardly directed IR sensors.

As depicted in FIG. **11**, the spout assembly **22** can be structured with a translucent covering **68** with markings or a decal **70**, which include a symbol or wording of instruction for operation of the device (e.g., the message “wave for air”) with one or more LED indicator lights **72** positioned underneath to flash or otherwise illuminate the overlying symbol or wording. The spout assembly **22** can also be structured to include one or more LED indicator lights **74** positioned underneath the translucent covering **68**, being optionally colored, for example, to indicate power, low power, low fragrance and to replace the fragrance dispersing module **56**, to indicate low filter and to replace the air filter **54**, etc. The infrared sensor **66** and the LED lights **72**, **74** are connected via wiring to a processor (PCB) **76** within the spout assembly, which, in turn, is connected to a power source. The processor **76** is configured to communicate with the sensor **66**, the LED indicator LED lights **72**, **74** and the fan motor **46** via wiring to turn on and off the fan motor **46** of the drying module **28** when the infrared sensor **66** is or isn’t activated.

In installing the air dispensing apparatus **10** as a side mount with an automatic faucet **16**, water flow can be activated by movement of the hands in proximity to a sensor associated with the water faucet **16**, and air flow can then be activated by movement of the hands in proximity to the infrared sensor **66** associated with the air dispensing apparatus **10**.

In embodiments, the electronics of the air dispensing apparatus **10** and an automatic faucet **16** can be connected through a processor to synchronize the two systems to function together such that the automatic faucet is first activated and, when the water flow stops, the air dispensing apparatus **10** is then actuated to deliver air to dry the hands.

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The processor connected to both systems can also be programmed as to when (and/or for how long) the automatic faucet **16** and/or the air dispensing apparatus **10** are activated, among other configurations.

In cases in which it is desired to install the air dispensing apparatus **10** with an existing faucet, a retrofit can be readily achieved on the side of an already installed faucet (manual or automatic). In embodiments, the air dispensing apparatus **10** can be installed as a side mount in conjunction with an existing manual faucet and, in use, once a subject is done washing their hands, they would simply turn off the faucet and activate the air dispensing apparatus **10** by waving a hand over the spout assembly **22** to actuate the device.

In a side mount arrangement, the positioning of the infrared sensor **66** in the upper surface of the spout apparatus **22** for activation of the air dispensing apparatus **10** substantially avoids accidental triggering of the sensor in the adjacent automatic faucet. Referring now to FIG. **12**, in some embodiments in which the side mount installation of the air dispensing apparatus **10** is a retrofit of an existing faucet (manual or automatic), a wire **78** from the electronics **80** of the air dispensing apparatus **10** can be connected to the water intake **82** for the water faucet **16**, such that if the water is on and flowing, the air dispensing apparatus **10** will not activate until the water flow stops. This set-up ensures that only one of the systems is working at any one time and/or sequenced such that upon completion of a hand washing, the air would initiate for a set period of time.

In another embodiment of a retrofit installation, illustrated in FIG. **13**, an electro-mechanical valve **84** can be attached to the water intake pipe **82** leading to an installed automatic faucet **16** (just prior to the faucet), and the electro-mechanical valve **84** can be connected to the electronics **80** of the air dispensing apparatus **10**, which activates the valve **84** to override and stop water flow to the faucet **16** when the air dispensing apparatus **10** is functioning. In this arrangement, the valve **84** closes the pipe **82** to stop the flow of water to the automatic faucet **16**. This set-up can be used in applications in which the sensor associated with the automatic faucet **16** continues to go on when the air dispensing apparatus **10** is activated, or if the faucet **16** employs a capacitance sensor that senses a hand or other object in proximity to the sensor (e.g., in a 360° radius) rather than under a specific focal point (as is typical with an IR sensor), which could repeatedly or continuously turn the faucet on during use of the air dispensing apparatus **10**.

The mechanical valve assembly **84** is thus controlled by the air dispensing apparatus **10** such that when the air dispensing apparatus is activated, the associated firmware in the system communicates to the valve to shut off water flow. Then, upon completion of the hand drying, the valve would open and the water would be dispensed. This set-up allows an existing automatic faucet to be retrofitted with the air dispensing apparatus with the need for replacement.

In another embodiment, FIGS. **14-19** illustrate an air dispensing apparatus **86** according to the disclosure, which is structured as a multi-functional system to deliver air and water or other fluid.

Referring to FIGS. **14-15**, in the depicted embodiment, the multi-functional air dispensing apparatus **86** is shown mounted through a counter **12** of a sink **14** as a center mount. Also depicted are a water valve and mixer assembly **18** for automatic hot and cold water delivery and a standard plumbing drain **20** connected to the sink **14**. FIG. **18** illustrates the apparatus **86** in an exploded view, and FIGS. **16-17** depict the air dispensing apparatus **86** without the presence of the counter **12** or sink **14**.

As illustrated, the multi-functional air dispensing apparatus **86** comprises a spout assembly **88** mounted through a hole **90** in the counter **12** (or other support substrate). The multi-functional air dispensing apparatus **86** incorporates the air drying module **28** as described hereinabove with respect to the embodiment of the air dispensing apparatus **10** depicted in FIG. 1-8.

The spout assembly **88** is structured with a spout housing **92** having an outlet **94** for dispensing the water and the air therethrough. The spout assembly **88** includes separate connections **96a**, **96b** to a water source (line) **98** and to the housing **26** of an air drying module **28**, which are positioned under the counter **12**. The connections **96a**, **96b** are mounted onto separate openings into the spout housing **92**.

In embodiments, the housing **26** of the drying module **28** is releasably connected to the spout assembly **88** via a flexible tubing **42**, and the drying module **28** is affixed to a support bracket **44** that can be mounted on a supporting wall or other substrate.

The spout assembly **88** includes a tubular connector **100** having an end **102** that is structured for mating connection onto a first end **104a** of the flexible tubing **42**. The second end **104b** of the flexible tubing **42** is structured for mating connection to the open end **38** of the housing **26** of the drying module **28**. In embodiments, the ends **104a**, **104b** of the flexible tubing **42** are connected to the tubular connector **100** and the housing **26** of the drying module by a quick release mechanism, for example, by a bayonet mount.

As illustrated in FIG. 19 (similar to the embodiment of the air dispensing apparatus **10** described hereinabove), the drying module **28** can include LED indicator light(s) **62** and/or control switch(es) **64a**, **64b**, and a fragrance dispersing module **56**.

The air dispensing apparatus **86** further includes one or more sensors which can be positioned below or above the spout assembly **88** as described hereinabove for the embodiments of the air dispensing apparatus **10**. For example, FIG. 17 illustrates a sensor **106** situated below the spout assembly **88**. In embodiments, the sensor is a capacitance sensor or infrared sensor. For example, the sensor can be a capacitance sensor which is configured to sense hands in a nearby proximity and signal a processor to close a circuit, initiate dispensing of water to wash the hands, end the water flow and initiate air flow from the drying module **28**.

In embodiments of the multi-functional air dispensing apparatus, activation of the sensor activates a microprocessor configured to first activate the water source dispenser for a first time period to dispense water through the outlet of the spout assembly, then secondly activate the drying module to draw air into the drying module and force the air through the outlet of the spout assembly for a second time period. In another embodiment, first and second infrared sensors can be positioned on either side of the spout assembly **88**, on top of the spout assembly (e.g., as shown in FIG. 11) or below the spout assembly (e.g., as shown in FIG. 17) wherein activation of the first sensor actuates water flow and activation of the second sensor actuates air flow. In other embodiments, a first sensor can be positioned below the spout assembly **88** to sense hand movement to start the water flow (as depicted in FIG. 17 and in FIG. 3 by sensor **66**) and a second sensor can be positioned on top of the spout assembly **88** to initiate air flow (as depicted in FIG. 11 by sensor **66**). In embodiments, the infrared sensor is programmed through a processor to dispense water by a single

pass of an object, and dispense air by two or more passes of an object within a set time period.

It is specifically intended that the present disclosure not be limited to the embodiments and illustrations contained herein, but include modified forms of those embodiments including portions of the embodiments and combinations of elements of different embodiments as come within the scope of the following claim

We claim:

1. An apparatus comprising:

a spout assembly mounted through a support substrate and structured with an outlet;

a drying module connected to the spout assembly;

a fragrance dispersing module connected to the drying module;

wherein the drying module is structured to be operably activated for forcing: (i) an airflow through the outlet of the spout assembly and (ii) another airflow one way from the drying module into the fragrance dispersing module such that fragrance is dispersed into the air outside of the drying module, but does not pass into the spout assembly;

wherein the fragrance dispersing module comprises a housing that is structured with air vents for passage of air therethrough from the drying module by activation of the drying module.

2. The apparatus of claim 1 wherein the housing contains a fragrance material.

3. The apparatus of claim 1, wherein the housing of the fragrance dispersing module contains a wicking material comprising a fragrance substance.

4. The apparatus of claim 1, the fragrance dispersing module is releasably mounted in an external structure of the drying module.

5. The apparatus of claim 3, wherein the fragrance dispersing module comprises a handle.

6. An apparatus comprising:

a spout assembly mounted through a support substrate and structured with an outlet;

a drying module connected to the spout assembly;

a fragrance dispersing module connected to the drying module;

wherein the drying module is structured to be operably activated for forcing: (i) an airflow through the outlet of the spout assembly and (ii) another airflow one way from the drying module into the fragrance dispersing module such that fragrance is dispersed into the air outside of the drying module, but does not pass into the spout assembly;

wherein the drying module is operably connected to a motor-driven fan that is used for forcing at least one of the airflow through the outlet of the spout assembly and the another airflow from the drying module into the fragrance dispersing module; and

wherein the motor-driven fan is used to force both of the airflow through the outlet of the spout assembly and the another airflow from the drying module into the fragrance dispersing module.

7. The apparatus of claim 6, wherein the drying module further comprises an air filter.

8. The apparatus of claim 6, wherein the apparatus further comprises an air heating mechanism and the drying module is configured with an on/off switch to the air heating mechanism.

9. The apparatus of claim 6, wherein the support substrate comprises a sink, a counter of a sink, a table, or a cabinet.